Publication 851 December, 1950

IRRIGATING THE PRAIRIE HOME GARDEN

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6M-14506-12-50

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Introduction

The home garden is often the most valuable piece of ground on the farm. It is rather difficult to put a monetary value on a good garden because the worth of vegetables in protecting the health of the family may far out-weigh any cash value placed on the crops produced. In dry regions where the garden must depend on the natural moisture supply, results are sometimes disappointing. This difficulty can be overcome by the use of irrigation. Two methods of irrigation are commonly followed, surface flooding and the use of sprinklers. Before actually applying the water, however, other aspects of the problem will be discussed.

Water Supply

The water supply is of most importance in irrigation. Not only must there be sufficient water to produce a high yielding garden but it must also be relatively free from alkali salts so that the soil does not become unproductive through increased alkalinity. If there is doubt about the suitability of the water it should be analysed. Information as to where this service is available may be had from the nearest Experimental Station.

There are several sources of water supply. Underground water, if in sufficient quantity, can be pumped from a well. Surface supplies, such as lakes and streams, are sometimes available. Water may be supplied from storage reservoirs such as dams and dugouts where surface run-off is impounded. The most common water supply on the prairies for garden irrigation is the farm dugout.

It takes more water than is usually estimated to irrigate a specified area of land. A dugout 150 by 70 by 11 feet deep will supply enough water to irrigate about one acre for one season. However, an irrigated garden of this size will yield a surprising quantity of vegetables and it will require an equally surprising amount of time to keep this garden free of weeds.

Where a farmer has enough water supply to irrigate more than one acre he would be wise to use this surplus water for the growing of some specialized crop, such as forage seed, registered cereals, or an emergency fodder supply. If the water supply is limited, however, the water should be used to produce a high yielding garden and to beautify the home surroundings.

This bulletin is concerned primarily with the irrigation of the home garden. For information on irrigating larger acreages, apply to the nearest Experimental Station.

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Location of the Garden

The garden will likely, of necessity, be near the water supply, but if there is a choice, certain factors should be considered. The type of soil is important. A silty loam soil is ideal for the production of vegetables. A general rule, if there is a choice between a heavy clay and a light medium textured soil, would be to choose the lighter soil area, other conditions being equal. The topography of the land should also be considered. The main advantage of sprinkler irrigation is that heavy levelling is not required. The topography, therefore, is not so important when the garden is going to be irrigated by sprinklers. For surface irrigation, however the choice of topography is of first importance. Land which has a uniform slope of 6 inches or less in 100 feet, together with adequate surface drainage, is ideal. It is wise, therefore, to choose a gradual slope rather than a steep slope. A uniform slope is preferred to an area of uneven or rolling topography. The location of the garden in relation to the home should be considered. A garden located near the home saves time in going to and from it and enables the gardener to keep it under closer observation.

Fertility of the Garden

The application of water to a garden does not necessarily mean that a high yielding garden will result. To get maximum value from the water, it must be applied to a fertile soil. An irrigated garden, since more produce is being harvested, may require the addition of fertilizers. Manure is one of the most satisfactory fertilizers for home gardens because it not only supplies the plants with nutrients but it adds organic matter and improves the texture of the soil. Well rotted manure can be applied at a rate up to 20 tons per acre. Manure alone, however, does not provide a fully balanced fertilizer and, in order to secure maximum quality as well as high yields under irrigation, it is advisable to add commercial fertilizer, particularly phosphate. The soils and climatic conditions vary widely across the prairies and fertilizer treatments need to be varied accordingly to obtain the best results. For average conditions, the most common practice is to apply ammonium phosphate at the rate of 80 to 100 pounds per acre. Side dressing with fertilizer at a rate of one pound per 218 feet of row, when the rows are spaced two feet apart, is equivalent to 100 pounds per acre. Information can be obtained from the nearest Experimental Station on the proper types of fertilizers to be used with various crops.

The vegetables to grow in the garden will depend on family tastes and on the adaptability of the various kinds to local conditions. Table I lists varieties of vegetables recommended for southwestern Saskatchewan, For other areas, advice could be secured from the nearest Experimental Station.

TABLE 1—VEGETABLE VARIETIES FOR SOUTHWESTERN SASKATCHEWAN

Vegetable	Variety
ASPARAGUS	Martha Washington, Mary Washington
BEANS	Green—Longreen, Stringless Green Pod, Masterpiece Wax—Round Pod Kidney Wax, Pencil Pod Black Wax
BEETS	Special Early, Detroit Dark Red (Short Top)
CARROTS	Nantes, Chantenay
CABBAGE	Early—Golden Acre, Jersey Wakefield Late—Penn State Ballhead, Danish Ballhead
CAULIFLOWER	Early Erfurt, Snowball
CORN	Early Golden Sweet, Dorinny, Marcross Hybrid, Spancross Hybrid
CELERY	Utah (Salt Lake)
CUCUMBER	Early Russian, Early Fortune, Davis Perfect, Straight 8
LETTUCE	Leaf—Grand Rapids Head—New York No. 12
ONION	Sets—White or Yellow Dutch Seed—Mountain Danvers, White Portugal (pickling) Transplants—Giant Yellow Prizetaker
PARSNIPS	Short Thick
PEAS	Early—Mammoth Early, Alaska Main Crop—Lincoln (Homesteader)
PUMPKIN	Sweet Sugar (New England Pie)
RADISH	Red—Saxa, French Breakfast White—White Icicle
RHUBARB	Macdonald, Sutton
SQUASH	Buttercup, Kitchenette, Green Hubbard, Golden Hubbard
SPINACH	Early—Bloomsdale Late—New Zealand
SWISS CHARD	Lucullus
TOMATOES	Non-staking—Early Chatham, Bounty Staking and Pruning—Harkness, Best-of-All
TURNIP	Summer—Purple Top Milan Rutabaga—Laurentian
VEGETABLE MARROW	Long White Bush
POTATOES *(Dryland)*	Pink—Early Ohio, Warba White—Irish Cobbler, Gold Nugget, Earlaine (trial only)
POTATOES *(Irrigation)*	Netted Gem, Columbia Russett

Planning the Garden

The location of the various vegetables in an irrigated garden requires careful planning. In order to simplify the irrigation of the garden it is desirable to plant the vegetables according to the time of maturity. Early crops such as radish, lettuce, and greens which will be harvested early should be planted together. Other crops such as potatoes, which seldom require water after August 15, should be planted where it will be possible to avoid watering them after this date. Late vegetables such as cabbages and carrots for winter storage, parsnips and swede turnips, which may require water as late as September 15, should be planted at one end or side of the garden.

Seeding the Garden

Seeding of such vegetables as onions, carrots, parsnips, peas, lettuce, etc., is best done soon after May 1. Corn, beans, and vine crops are best delayed until May 15 or later, depending on the season. The setting out of well hardened cabbage and cauliflower plants can be done after May 15, but tomatoes, egg plants, and peppers should not be set out until after June 1.

Thinning the Vegetables

The importance of thinning vegetables under irrigation is not nearly so great as under dryland conditions. Irrigated carrots will become overlarge and coarse where heavy thinning is practised. For this reason, root crops such as carrots and beets are generally seeded thinly and are not subsequently thinned when irrigation is practised.

Weeding

The success of the garden in large measure will depend on the control of weeds. Weeds are most satisfactorily controlled when they are young. The modern wheel hoes are valuable labour-saving devices and are highly recommended.

Land Preparation

In order to irrigate a garden, it is not absolutely essential to have the plot levelled to a fine degree. Land preparation is important, however, because the better the land is levelled the easier it is to irrigate and the more uniform the stand will be. The farmer should not be discouraged from irrigating, however, simply because his land is not levelled to perfection.

The important consideration is that the water should be able to flow freely from the upper to the lower end of the garden and that the excess water can escape so it will not back up and flood any of the vegetables. Irrigation can be made easier by floating or smoothing the ground surface every year before seeding. This is accomplished simply by dragging a heavy timber, iron rail, or similar object across the garden. Best results are obtained by floating in two directions. The land must be moderately dry for floating since a fair amount of loose soil is needed for satisfactory results. After floating, the land should be made rough by a light cultivation to guard against the danger of soil drifting. Land preparation need not be done all at once, but may be extended over a period of years, as the irrigator gains experience in the application of water.

Irrigating the Garden by Surface Methods

Any practice that will add moisture to the soil in the spring without causing erosion of the land should be encouraged. Such practices include flooding before seeding or the use of snow traps. Flooding the garden during the growing season is not recommended, however, because water in contact with the plants may have injurious effects. In addition, flooding is not an efficient means of applying water because a large proportion of the water is wasted. When the water supply is limited it is important to reduce the amount of waste water to a minimum by following carefully controlled irrigation practices. The most commonly recommended way of applying irrigation water to the garden is the furrow method.

Time to Irrigate

The frequency of irrigations will depend on the climate and soil type. Because of wide variations in these factors, definite rules cannot be stated. The important point to remember is that the soil should not be allowed to become dry. The ground should be kept moist during the growing season but not waterlogged. The irrigator should explore below the ground surface with a spade or auger to determine when to irrigate and when to stop the water flow. An irrigation should thoroughly wet the ground to a depth of 18 to 24 inches. When possible, the first irrigation for potatoes should be delayed until about the time the blooms start to appear. From then on they should be given frequent light irrigations. If surplus water is available in the fall it is an excellent practice to plough the garden and apply all surplus water at that time.

Furrow Irrigation

The common type of surface irrigation for gardens is the furrow method. The garden rows are usually seeded down the steepest slope and furrows made between the rows. The water runs in small streams down each furrow. The size of stream for each furrow will depend on the degree of slope; the steeper the slope the smaller the size of stream. The ideal size of stream is one that will thoroughly wet the soil down to the depth of the root zone for the full length of the row, with no run-off. In practice, it is generally advisable to use a fair sized stream at the start to carry the water to the end of the row as quickly as possible and then reduce the flow in each furrow to a point where the stream is just enough to keep a flow throughout the entire length of the furrow, but small enough to reduce run-off to a minimum. If the slope is so steep that the size of stream cannot be reduced enough to prevent erosion and excessive run-off the garden rows will have to be seeded at an angle to the slope to reduce the velocity of the water.

The furrow method may differ according to the way in which the water is transported to or along the upper edge of the garden. If the garden is below the water supply, no pump is required, the water being carried to the garden by open ditch and distributed by gravity. However, if the garden is above the water supply, a pump will be required to lift the water to the area to be irrigated. The water is pumped into an open ditch which carries and distributes it to the furrows. A third method is that in which the water is pumped through gated pipe and the water turned out in small streams, one for each furrow.

Simple furrow method.—Figure 1 shows a simple method of irrigating a garden from a supply ditch. An opening is cut in the ditch bank for each furrow. The flow can be regulated to a certain extent by the depth and width of the cut or by placing burlap or pieces of sod in the openings.

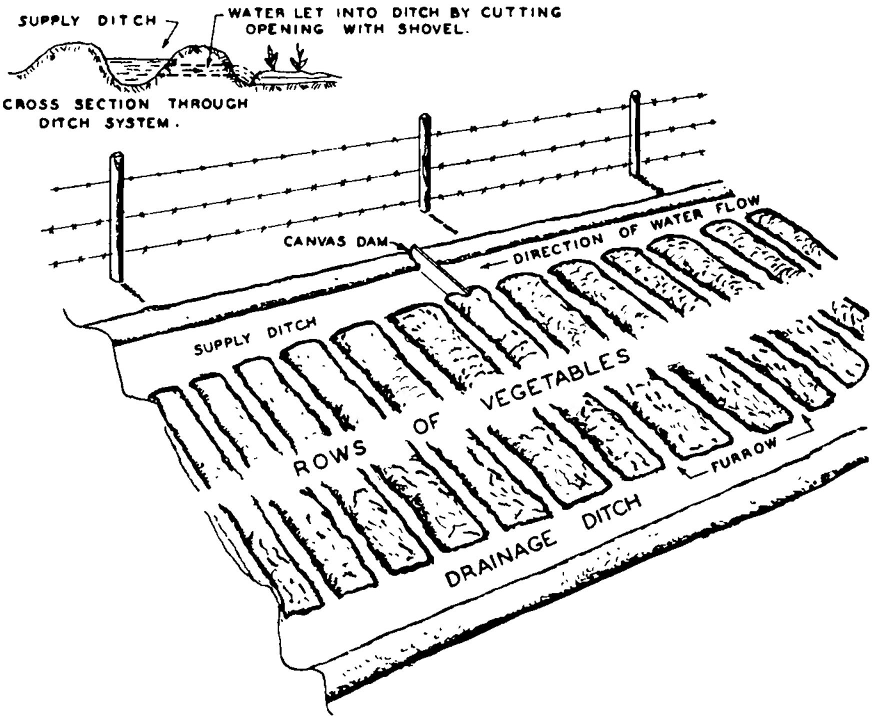


Figure 1.—A simple form of garden furrow irrigation.

Controlled furrow irrigation.—Better means of control will be adopted as experience is gained. The size of stream can be controlled to a finer degree by placing small culverts in the ditch bank. This also produces a firmer ditch bank. These small culverts can be constructed by nailing together four pieces of lath, two feet long, or by cutting two-foot lengths of one—or two-inch pipe, or by simply making up cylindrical rolls of tar paper or using short pieces of rubber hose. The culverts are placed in the ditch bank openings and dirt packed around and above the culverts so that the ditch bank is once again solid.

Plastic or aluminum siphons are very simple to use and give still better control of water. These, however, are more expensive than the small culverts and are not absolutely essential.

Additional methods of controlling rate of flow are as follows:

1. The use of adjustable canvas dams as shown in Figure 2. This adjustable dam allows surplus water to flow past so that a number of furrows below the first setting can be irrigated at the same time. This type of dam makes it easier to manage a stream of water that may be slightly large. The control is obtained by adjusting the opening in the boot by means of a draw-string.

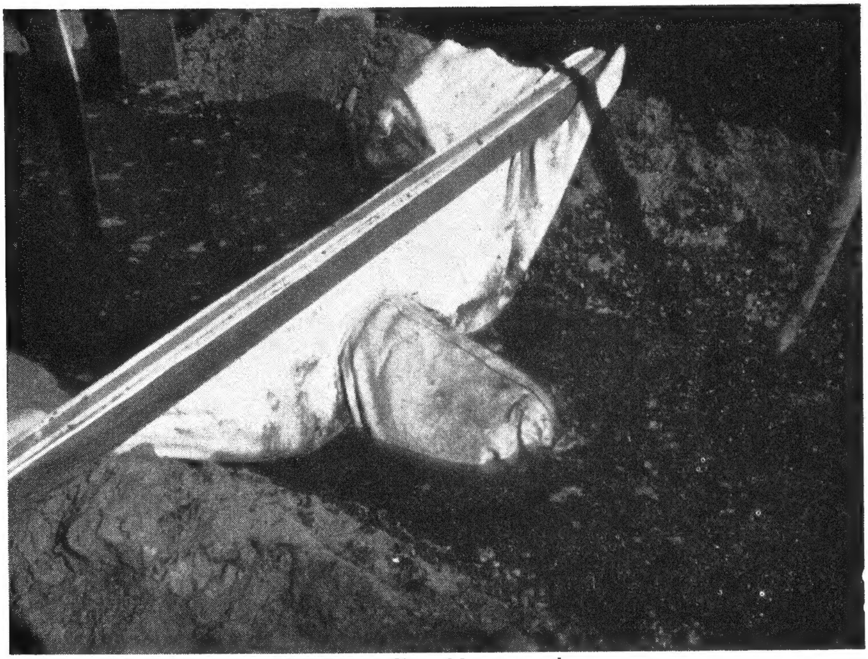
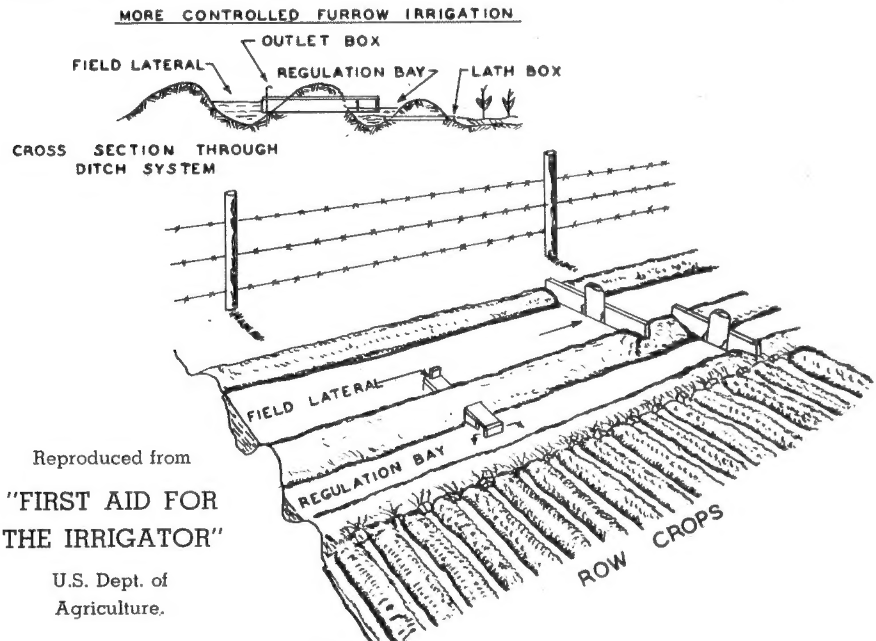


Figure 2.—Adjustable canvas dam.

2. Construction of a secondary ditch parallel with and adjacent to the supply ditch. This method, which gives a finer degree of control, is explained in "First Aid for the Irrigator" by Ivan D. Wood, Farm Security Administration, United States Department of Agriculture, Washington, D.C., and is illustrated in Figure 3. The adjustable canvas dams are placed in both the supply and secondary ditches.



Reproduced from

"FIRST AID FOR THE IRRIGATOR"

U.S. Dept. of Agriculture.

Figure 3.—Controlled furrow irrigation.

Turnouts as shown in Figure 4 are used to divert water from the supply to the secondary ditch. Constructing the turnouts as shown in Figures 3 and 4 prevents erosion of the opposite ditch bank.

Figure 4.—Turnouts delivering water to secondary ditch.

3. Raising the water level slightly, if more water is desired, by pushing shingles and pieces of scrap lumber into the ditch as shown in Figure 5. This supplies more water to the furrows above this point.

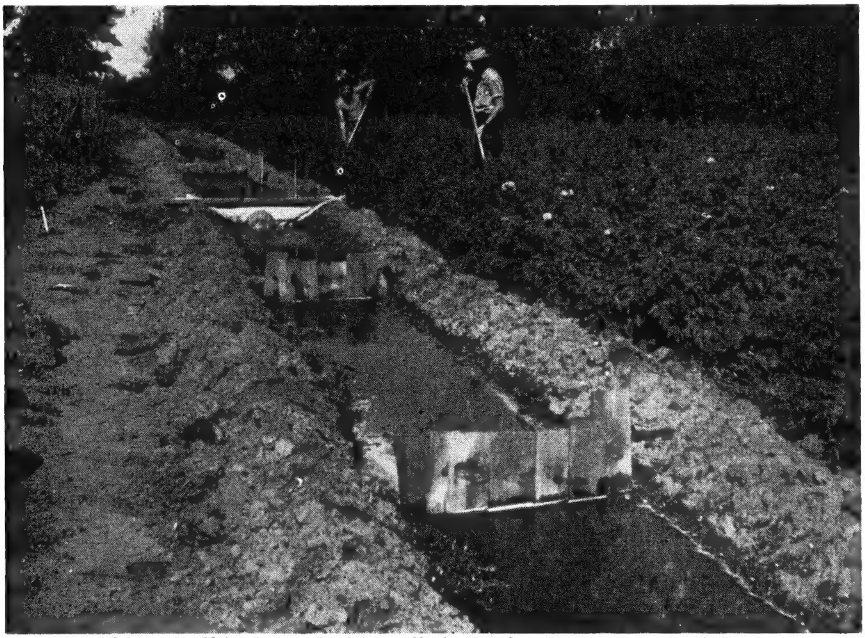


Figure 5.—Shingles pushed into ditch to raise the water level slightly.

4. Using gated pipe as shown in Figure 6. This method permits the finest degree of control. As will be noted, pieces of cardboard or burlap are placed under the stream to reduce erosion. The pipe has holes at regular intervals, each with a sliding gate.

Figure 6.—Irrigating by gated pipe.

Control of size of stream can be obtained by moving the sliding gate as shown in Figure 7.

Figure 7.—Adjusting the size of stream.

The importance of being able to control the size of stream is pictured in Figures 8 and 9. Figure 8 illustrates poor irrigation because the soil between furrows remains dry. The reason for this is poor adjustment of stream size. The stream in Figure 8 is too large, causing the water to flow so fast (note ripples) that the water is unable to soak into the soil. Figure 9 shows that the soil is moistened from furrow to furrow.

Figure 8.—Stream flow too fast. Note ripples in water and dry soil between furrows.

Figure 9.—Stream flow satisfactory.

Draining the Garden

Draining the excess water off the garden is just as important as applying the water. Garden vegetables will not stand more than a few hours of ponded water. If the excess does not flow away it is essential to dig a drain ditch at the lower end of the garden to prevent the water from ponding and destroying the vegetable crop. Too much run-off or waste water at the lower end of the furrow generally indicates that the stream used is too large or that the control is inadequate. If it is not possible to obtain a better control of the stream, the rows should be planted at an angle to the slope.

The Pump

When the water supply is below the level of the area to be irrigated, a pump is required to lift the water up to the land. A horizontal centrifugal pump such as shown in Figure 10 is recommended for irrigation.

Figure 10.—A small portable pump and engine unit.

It is essential that the pump purchased be capable of supplying the amount of water required at the garden. The pump then must be able to push or pull the water up the vertical lift and also force it through pipe. The most satisfactory procedure in purchasing a pump for surface irrigation is to supply the pump manufacturer with the following information:

(a) The total vertical lift or the vertical distance between water level and the highest point of the garden.
(b) The acreage to be irrigated.
(c) The type of water supply.
(d) The amount of pipe required to carry the water to the high point of the land so the water will flow by gravity from that point.
(e) The type of soil.

Note: A horizontal, centrifugal pump is limited in its suction lift to about 15 feet. The recommended practice is to place the pump as close to the water level as practically possible.

Irrigating the Garden by Sprinkling

Sprinkler irrigation has a place as a means of watering the vegetable garden and home surroundings, especially on land not suited to surface irrigation. Although sprinkler irrigation is generally more expensive, there are certain advantages to be considered. For example, sprinklers can be used where it is impossible or difficult to irrigate by the surface methods. Sprinklers permit better control and the more economical use of water on the lighter soils. The economy in the use of water is particularly important when the water supply is limited.

The advent of quick-coupling, light weight pipe has made sprinkler irrigation practical from a use standpoint. The "twist-of-the-wrist" couplers and the light weight also simplify pipe moving. A sprinkler system for a garden is easy to operate because problems associated with a large system are not prevalent.

Small sprinklers that operate at an average pressure of 25 pounds per square inch are recommended for garden irrigation. Space does not allow a complete discussion of the various makes, but most of this equipment is adjustable to some extent.

Figure 11.—A garden sprinkler, riser, and pipe coupling.

Although each sprinkler wets a circular area of 75 feet in diameter, sprinklers are spaced closer than 75 feet to get an overlap which is necessary for good distribution. The usual spacing of this type of sprinkler is 20 feet in the line with the lines 40 feet apart.

The sprinklers are attached by means of riser pipes. The risers must be high enough to place the sprinklers above the crop.

Factors in Design

The "package" unit is a standard sprinkling unit sold by some sprinkler irrigation firms. This would be an extremely desirable set-up, but unfortunately, one standard unit is not practical for all conditions. Each area actually requires an individually designed system because of the following factors:

(a) The acreage and dimensions of the field determine the total pump capacity and the amount of pipe required when the water supply is adequate. However, if the water supply is limited, as with a dugout, the supply is the determining factor.

(b) The total vertical lift is a factor in calculating the power required. This lift is divided into two parts, the suction and pressure lifts. The suction lift is the vertical distance from the water level to the centre line of the pump. The horizontal centrifugal pump has a practical suction lift limit of 15 feet, and in some cases, this determines whether the system developed will be portable pump or stationary pump. The pressure lift is the vertical distance between the centre line of the pump and the high point of land to be irrigated.

(c) The type of soil, cover, slope, and condition of the soil determine the rate of water application which affects the sprinkler size. This in turn determines the size and length of pipe required.

(d) The topography of the land must also be considered because it has a bearing on the pipe layout. It is desirable for the sprinklers to be on the same level, enabling them to distribute equal amounts of water. Other means of control which can be applied will be discussed later.

(e) The location of the garden in relation to the water supply also has a bearing on the amount of pipe required, which in turn also affects the power required.

It would be desirable, however, if a few standard units could be assembled to facilitate individual farmers in the purchase of sprinkler units for small garden irrigation.

A few standard units could be practical, but only under the following conditions:

(a) One rate of application for all soil types. This standard rate would then be 0.25 inches per hour.

(b) The area of garden constant, being one acre.

(c) The area to be adjacent to the water supply and large enough to enable choosing dimensions in accordance with the sprinkling system.

(d) Types of water supply:

  (i) Dugout 150 x 70 x 14 feet.

  (ii) Streams such as rivers or creeks and bodies of water such as lakes or dams with the water level no more than 15 feet below land level.

(e) Sprinklers spaced 20 feet in the line and the lines 40 feet apart.

Sprinkler Irrigation Designs

Figures 12, 13, 14, and 15 show four suggested sprinkler irrigation designs.

Design No. 1 (see Figure 12):

Water supply—Dugout or well

Topography—Level

Area—2 one-half acre plots, one on each side

List of material—

1		Pump (10 Imperial gallons per minute at 75-ft. head)
1		Engine (1 horse power)
80	ft.	2-in. portable main line
120	ft.	2-in. portable sprinkler line
2		2-in. elbows
6		Sprinklers (1.7 Imperial gallons per minute at 25 pounds per square inch)
6		Risers
1		2-in. end plug
35	ft.	2-in. suction pipe
1		2-in. foot valve
1		Adapter (pump to pipe)
1		Pressure gauge

Approximate cost—$350.00

Design No. 2 (see Figure 13):

Water supply—Dugout or well

Topography—Level

Area—1 one-acre plot

List of material—

1		Pump (10 Imperial gallons per minute at 75-ft. head)
1		Engine (1 horse power)
160	ft.	2-in. portable main line
120	ft.	2-in. portable sprinkler line
2		2-in. elbows
6		Sprinklers (1.7 Imperial gallons per minute at 25 pounds per square inch)
6		Risers
1		2-in. end plug
35	ft.	2-in. suction pipe
1		2-in. foot valve
1		Adapter (pump to pipe)
1		Pressure gauge

Approximate cost—$390.00

Design No. 3 (see Figure 14):

Water supply—Stream, with water level no more than 15 ft. below pump

Topography—Level

Area—1 one-acre plot

List of material—
- 1 Pump (10 Imperial gallons per minute at 75-ft. head)
- 1 Engine (1 horse power)
- 120 ft. 2-in. portable sprinkler line
- 6 Sprinklers (1.7 Imperial gallons per minute at 25 pounds per square inch)
- 6 Risers
- 1 2-in. end plug
- 35 ft. 2-in. suction hose
- 1 2-in. foot valve
- 1 Adapter (pump to pipe)
- 1 Pressure gauge

Approximate cost—$310.00

Design No. 4 (see Figure 15):

Water supply—Any type

Topography—Steep slope

Area—1 acre

List of material—
- 1 Pump (10 Imperial gallons per minute at 90-ft. head)
- 1 Engine (1 horse power)
- 180 ft. 2-in. portable main line
- 110 ft. 2-in. portable sprinkler line
- 1 2-in. elbow
- 6 Sprinklers (1.7 Imperial gallons per minute at 25 pounds per square inch)
- 6 Risers
- 1 2-in. end plug
- 35 ft. 2-in. suction pipe
- 1 2-in. foot valve
- 1 Adapter (pump to pipe)
- 1 Pressure gauge

Approximate cost—$390.00

GARDEN IRRIGATION SPRINKLER DESIGN No. 1

Level Land

Dug-out, or well and 2 one-half acre plots, one on each side of dug-out or well.

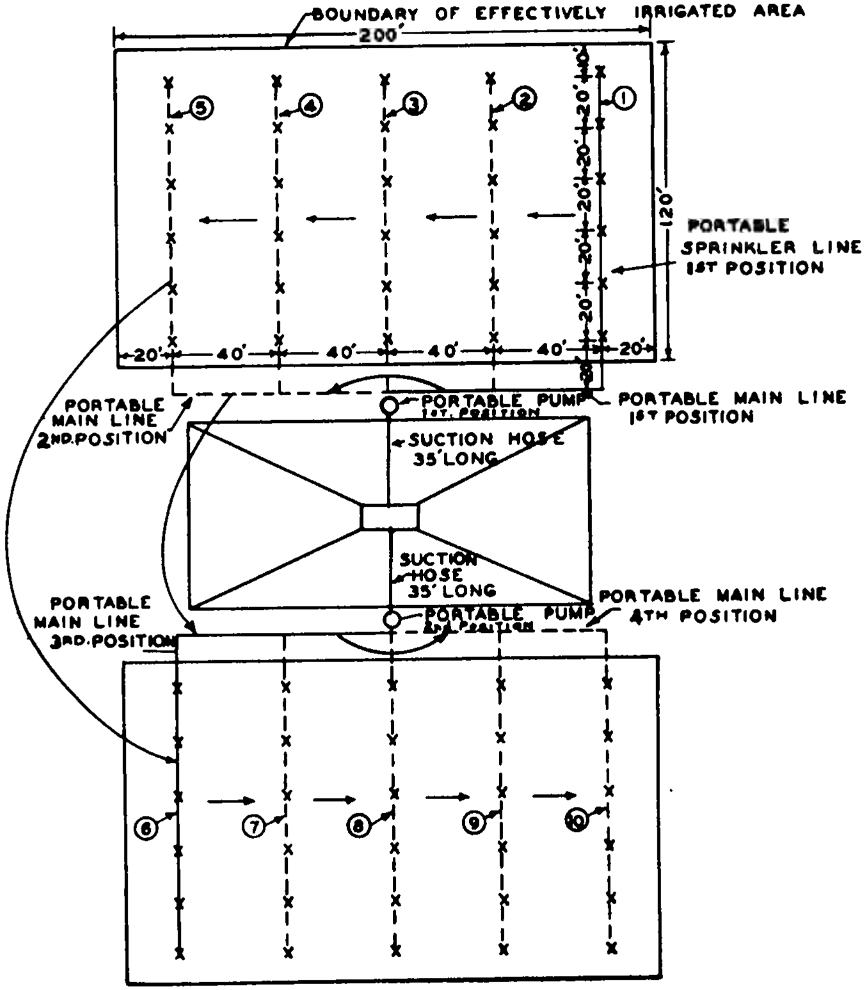


Figure 12.—Sprinkler irrigation design No. 1

GARDEN IRRIGATION SPRINKLER DESIGN No. 2

Level Land

Dugout or well and 1 one-acre plot.

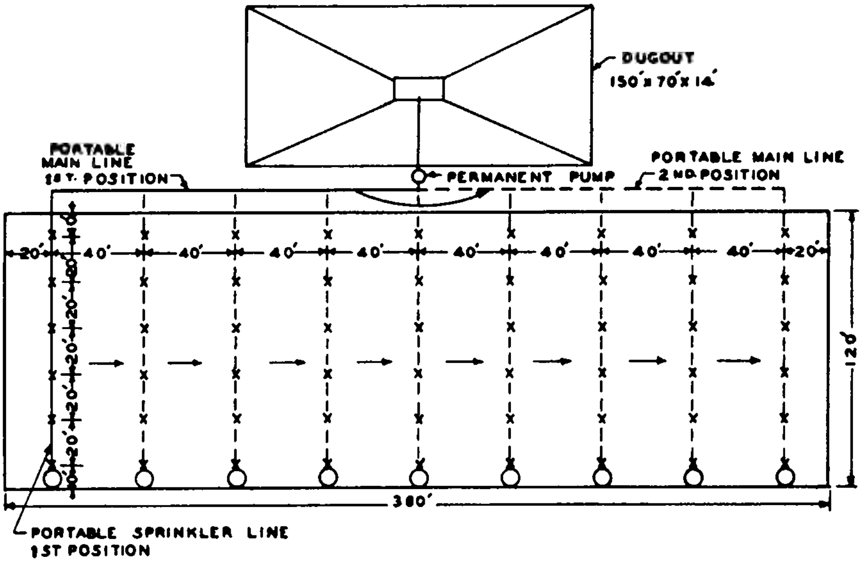


Figure 13.—Sprinkler irrigation design No. 2.

GARDEN IRRIGATION SPRINKLER DESIGN No. 3

Level Land

Stream—e.g.—River, creek, canal, or lake

1 one-acre plot

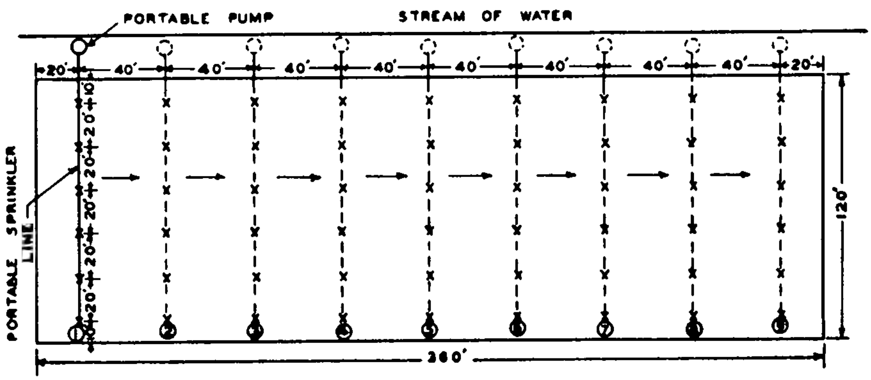


Figure 14.—Sprinkler irrigation design No. 3.

GARDEN IRRIGATION SPRINKLER DESIGN No. 4
Steep slope
1 one acre plot
Any type of water supply

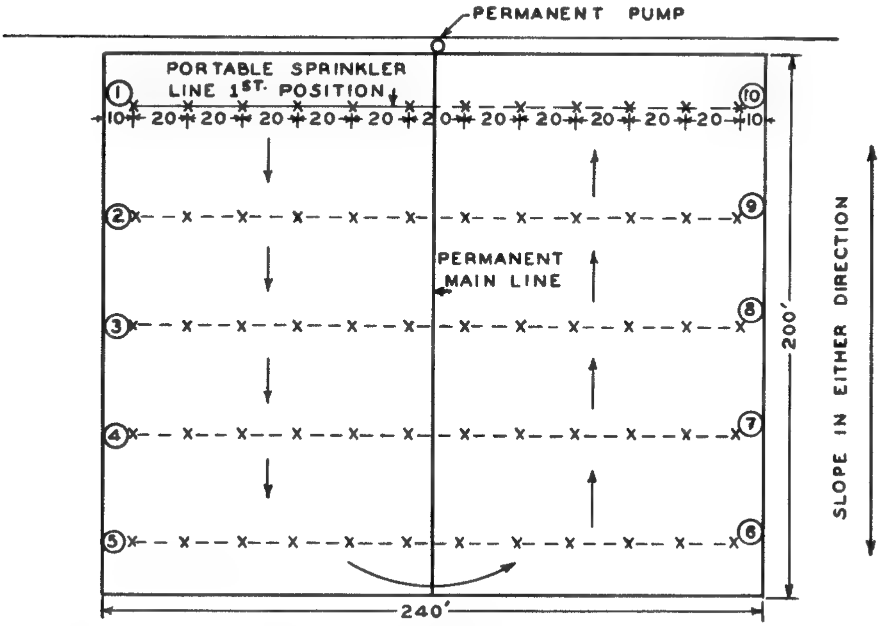


Figure 15.—Sprinkler irrigation design No. 4.

Photo by J. C. Wilcox.

Figure 16.—Sprinklers in operation.

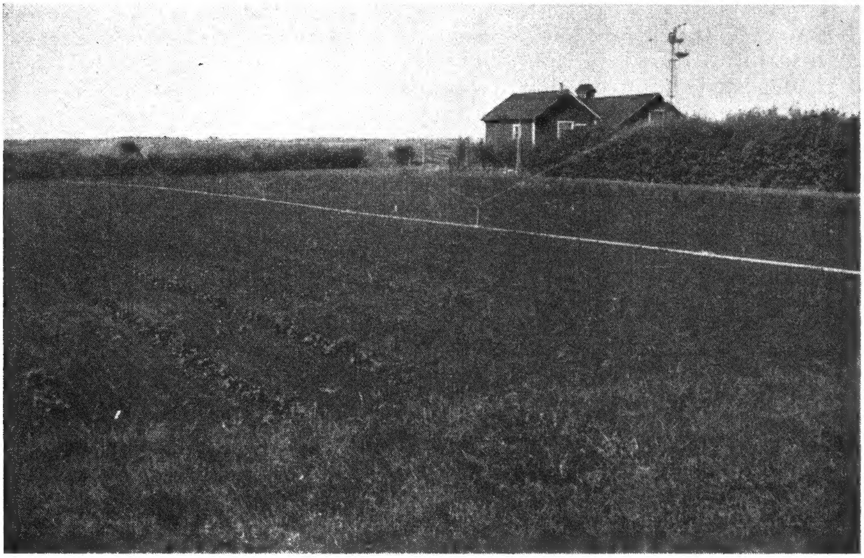


Figure 17.—Sprinklers irrigating a garden.

Comments on Design

1. The units shown are designed for the peak period of water use during hot, dry weather and considering 13-hour working days. These units will apply two 3-inch applications per month or a total of 6 inches. At a rate of application of 0.25 inches per hour, 12 hours are required to apply 3 inches or one set per day. Therefore, 9 days are required to apply 3 inches with Designs 2 and 3, while 10 days are required with Designs 1 and 4. The design then allows ample time for maintenance of the unit.

2. Irrigating on a steep slope requires certain precautionary steps. The allowable difference in pressure between the first and last sprinklers is 20 per cent. Designs 1, 2, and 3 meet these requirements on the condition that the land is relatively level. However, if the land has a steep slope and in such a direction that sprinkler lines of Designs 1, 2, or 3 are running up or down the slope, there are one or two alternatives. One alternative is to use Design 4, which places the sprinkler lines in an opposite direction so that they are relatively level. The other alternative, when the sprinkler lines run up or down the slope, is to put valves in each sprinkler riser and a pressure gauge in the top riser. Adjust the pressure to 25 pounds per square inch and check the distance that this sprinkler throws the spray. Then by means of the valves adjust the other sprinklers so that they throw the spray the same distance.

3. The designs actually require only 1½-inch pipe. However, since portable sprinkler pipe is not available in 1½-inch size, the designs call for 2-inch pipe.

4. The capacity of pump required for the designs discussed is small (10 Imperial gallons per minute) and the pressure is high (90 feet). Horizontal centrifugal pumps show poor efficiency at this low volume and high pressure. Turbine pumps are recommended in this case or a gear pump would also be suitable. Pumps of this type are positive so care must be taken to obtain the proper pump.

5. The designs show a sprinkler spacing of 20 by 40 feet. This spacing was chosen, even though a 30 by 30 foot spacing gives a better water distribution, because the majority of manufacturers supply pipe only in 20-foot lengths. It is suggested, however, that if pipe is available in 30-foot lengths, a 30 by 30 foot spacing be used.
6. The height of riser required will be determined by the crop grown. Risers should be high enough to enable the spray to be thrown over the tops of the plants.

Operational Hints

Clean water is needed for sprinkler irrigation in order to reduce frequency of plugged nozzles. It may be necessary, therefore, to attach a screen to the suction pipe entrance.

The sprinkler line should always be flushed after remaining idle for any length of time. To flush the line, remove the sprinklers and end caps and pump water through the system until water flows clean. Then shut down and replace sprinklers and end caps.

Care must also be taken, when moving the sprinkler line to a new location, to prevent dirt from getting into the pipe. It is a good practice to allow a little water to flow through the pipe while assembling a length of sprinkler line. This practice will reduce the frequency of plugged nozzles. Regardless, however, of the care taken, it is necessary to watch the sprinklers for plugging. They should be cleaned out immediately.

The sprinklers should be adjusted so that they are all turning at about the same speed and they should be set perpendicular to the ground. It is also a good practice to put a pressure gauge on the line to ensure operating the sprinklers at the proper pressure.

The wind has a detrimental effect on the water distribution, but the effect is lessened if it is possible to place the lines crossways to the direction of the wind.

Summary

The home garden can be irrigated by either the surface or sprinkler irrigation methods. The water supply for irrigation must be considered as to quality and quantity.

Factors to consider in addition to applying the water are location, fertility, planning, seeding, thinning, weeding, and land preparation.

The irrigator is advised to use a spade or auger to determine the time to irrigate, and cautioned to keep the soil moist during the growing season.

The main type of surface irrigation is the furrow method. The water may be delivered to the garden in three ways:

(a) Open ditch.

(b) Pump and open ditch.

(c) Pump and pipe.

The water may be distributed to the furrows by simply cutting outlets in the ditch bank or by the use of small culverts, siphons, or gated pipe.

Draining the garden is necessary to prevent injury to the plants from flooding.

Certain factors must be considered in purchasing a pump for irrigation purposes so that it may fit the individual conditions.

Sprinkler irrigation has a place in garden irrigation, especially on land not suited to surface irrigation.

Desirable as it may be to have a standard unit for garden sprinkler irrigation, it is not practical because of several varying factors in design. To simplify the problem, four suggested standard units are discussed for garden irrigation. These designs are possible only by standardizing some of the varying factors.

Acknowledgments

Mr. W. L. Jacobson, Head, Irrigation Investigations, Dominion Experimental Station, Lethbridge, Alberta, for his comments and advice on types of surface irrigation and for general assistance.

Dr. J. C. Wilcox, Assistant in Plant Nutrition, Dominion Experimental Station, Summerland, British Columbia, for advice on types of sprinklers for garden irrigation and photographs of sprinklers used in this publication.

Mr. R. M. Blakely, Officer-in-Charge, Horticulture, Dominion Experimental Station, Swift Current, Saskatchewan, for the table of varieties of vegetables and data on dates of seeding and other horticultural aspects.

Mr. A. E. Palmer, Superintendent, Dominion Experimental Station, Lethbridge, Alberta, for his assistance with the editing of this publication.

Mr. G. N. Denike, Superintendent, and Mr. J. L. Thompson, Officer-in-Charge of the Agricultural Engineering Division, Dominion Experimental Station, Swift Current, Saskatchewan, who read the manuscript and made helpful suggestions.

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King's Printer and Controller of Stationery,
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